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FIG 1

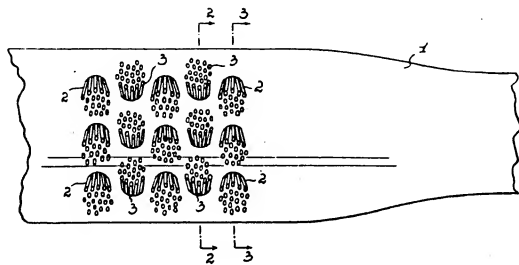


FIG 2

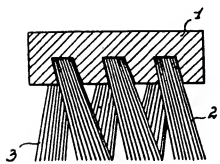
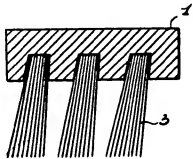


FIG 3



- distance 35°

Fig. 10 75°

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BRUSHES

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EXAMINER'S
COPY

DIV. 27

The hitherto known brushes do not satisfactorily comply with the practical requirements of use; this is true not only of cloth, hair and nail brushes but of any other kind of brushes whether they are flat, oval, circular; this deficiency applies particularly to tooth-brushes.

The indiscriminate application of tooth-brushes, often dominated with the regard to shape and construction by reasons of outer appearances and form appeal damages and destroys the tooth enamel which is the main protector against caries and rotting of the teeth.

Attempts were made to eliminate these drawbacks and dangers by grading the tooth-brushes into categories of hard, semi-hard and soft brushes; however, no remedy can be derived from this measure because at a timely retarded rate also the semi-hard and the soft brushes of customary design will attack the tooth enamel.

The further grave disadvantages involved in the use of the commercially available tooth-brushes consists therein that the massaging of the gums cannot be effected without causing pains and often injuries. On the other hand, the massaging of the gums is an indispensable component of the teeth cleaning procedure and dominates the preservation of the health of the teeth. If the gums are insufficiently blood-conditioned the teeth will not receive the required nutrition which is of decisive importance for their proper preservation and care. The blood-conditioning of the gums can only be effected by proper massage.

A particular disadvantage results from the application of the customary tooth-brushes insofar as the bristles imperfectly and insufficiently enter into the spaces between the teeth; a thorough treatment of these spaces is, however, indispensable as the deterioration and rotting of the teeth is mainly caused by inadequate cleaning of these recesses and spaces, the deterioration of the teeth being in most cases noticeable only after it has developed to a major extent and cavities have been created in the teeth.

The important function of a satisfactory tooth brush which consists in directing the gums towards the teeth and which prevents the freeing of the teeth from the gums is also not obtainable by the use of the hitherto known tooth-brushes. If the teeth are once deprived of their natural protection by the gums their deterioration is inevitable.

The above listed drawbacks and insufficiencies of the ordinary tooth-brushes are obviously due to the fact that the bristles are vertically positioned; they therefore pierce the tooth enamel like needles and create channels which promote and accelerate

the deterioration of the teeth; on the other hand, they cannot be properly used for massaging purposes, because they involve the danger of injuring the gums. It is also an often made experience that the skin of the head or the skin of the fingers located underneath the nails is pierced and badly injured by the use of the vertical bristles of ordinary head and nail brushes. The same observation is often made with regard to cloth brushes which tear the articles to be cleaned and are particularly harmful to fine and delicate textiles, which are abraded instead of being cleaned.

According to the invention, the aforesaid drawbacks are eliminated by positioning the bristles or bristle tufts in a zig-zag manner or inclining the bristles and bristle tufts in the individual rows alternatively at an acute angle.

The inclination of the bristles in the adjacent rows of bristles or bristle tufts will preferably alternate in opposite directions; if for instance all the bristle tufts of one transverse row are inclined towards the left relative to a vertical longitudinal plane, then the bristle tufts of the adjacent transverse row will be all inclined towards the right.

The applicability of the invention is independent of the position of the bristles or bristle tuft rows, which may extend all at a right angle relative to a longitudinal vertical centre plane of the brush back or may be diagonally in relation thereto.

The magnitude of the acute angle which determines the degree of inclination of the bristles or bristle tufts is limited in such a manner that a premature mutual crossing of the bristle tufts of the adjacent transverse rows and before the ends of the bristles reach the operating area of the brush is prevented. This angle of inclination should be less than 35 degrees and preferably 10 to 20 degrees. The working ends of the bristle tufts are thereby uniformly distributed over the entire operating area of the brush which is represented by the ends of the bristles and excessive non-operative interstices and voids are avoided.

Brushes and also tooth-brushes have been already devised where the bristle tufts in the longitudinal rows are alternately inclined towards the right and the left side. The angle of inclination is such that the tufts of one longitudinal row and the tufts of the adjacent longitudinal row cross each other approximately in the middle of their length or long before their ends reach the operating area of the brush.

With these brushes only a portion of the bristle tufts is operative as a cleaning element, whereas the other portion serves as an aftertreating of polishing means; here only one longitudinally row of inclined

bristle tuft functions as a brushing element, whereas the adjacent row smooths-over or polishes; it is only the forwardly inclined portion of the bristle tufts that causes a brushing or better a scratching action, because these forwardly inclined bristles actually scratch and do not brush.

A two-row brush of this type has only half the operating capacity of its bristle tufts, because only one row brushes or better scratches; the second row of bristle tufts polishes only.

As previously stated, one important purpose of the invention resides in a bristle arrangement which will enlarge the operating area of a brush over hitherto customary brushes having an equal number of bristle tufts; this primarily enlarged operating area of the brush is then additionally increased during use due to the spreading of the bristles in a transverse direction relative to the brush back; with a brush where the tufts are inclined in the plane of the longitudinal axis or parallel thereto the increase of the operating area due to the inclination and spreading of the bristles is hardly noticeable because these functions will occur in the longitudinal direction of the tufts; the increase of the working area is here only a small fraction of the length of the tuft row; the spreading in the transverse row however represents a considerable increase of operating area.

A brush constructed in accordance with the invention and having for instance three longitudinal rows is due to a transverse inclination of the tufts already from the beginning increased to a working capacity is further enlarged during use to be equal to that of a normal brush having up to seven rows of bristle tufts, whereas the enlargement of the same brush with longitudinally inclined bristle tufts during use is negligible.

Another important feature of the invention is the limitation of the inclination of the bristles or bristle tufts.

A brush where the tufts are strongly inclined will lose most of its entering force, because the tufts are still more bent during use, whereas a brush, where the transverse inclination is limited, will retain its penetrating and cleaning capacity.

The invention will now be described in detail and in its application to a tooth-brush; however, it is to be understood that the invention is well applicable to all other types of cleaning brushes.

The present embodiment of the invention is illustrated by way of example in the attached drawings on a somewhat enlarged scale, wherein

Figure 1 is a fractional top view of a tooth brush showing the bristle tufts arranged in accordance with my invention;

Figure 2 is a vertical sectional view on lines 2—2 of Figure 1; and

Figure 3 is a vertical sectional view on lines 3—3 of Figure 1, the latter two views being taken from the opposite side of that of Figure 1.

As apparent from the drawings the bristle tufts are mounted in the brush back 1.

The bristle tufts 2 of one transverse row are inclined to the right and the bristle tufts 3 of the adjacent transverse row are inclined in the opposite direction, that is to the left.

The angle of inclination and the distance of the tufts of the adjacent rows in chosen in such a manner that the bristle tufts cannot cross each other but substantially meet with their ends in the operating face of the brush; this angle should preferably be smaller than 35 degrees.

The novel and progressive arrangement of the bristle tufts in accordance with my invention is based on the following recognitions.

The customary bristles or tufts possess a certain degree of elasticity and this applies as well to natural bristles as to synthetic, for instance, nylon bristles. However, both have the very discomforting tendency to be deformed after a certain period of use and to be bent from their originally vertically disposed mounting.

This drawback is particularly noticeable if the brushes are subjected to energetic stresses during use.

The above mentioned spreading and bending of the tips or ends of the bristles of a brush and particularly of a tooth-brush, which is a common experience, is especially apparent if the teeth are not only lengthwise brushed, but also the spaces are cleaned between the teeth and the gums are massaged for which purpose the upper gum must be cleaned by a downward stroke and the lower gum by an upward stroke of the brush. This is best done by holding the horizontally disposed tooth-brush in contact with the teeth and rolling the same from the gums towards the teeth in an upward and downward direction.

By this operation the ends or tips of the bristles will be strongly bent over on both long sides of the tooth-brush; it even happens that the bristles break due to excessive outward bending.

A tooth-brush which is so strongly deformed becomes practically useless; the same experience of bristle deformation is also made with other brushes. In the case of the invention this bending and spreading tendency of the bristles caused by the massage of the gums and by the cleaning of the interstices between the teeth is counteracted by their inclination in opposite directions of the transverse rows, because during the downstroke one row and during the upstroke of the brush the adjacent row is bent in a direction contrary to its inclination.

Further advantages of my improved brush are as follows:

The brush possesses a surprisingly high cleaning and gum massaging efficiency without however causing injuries to the treated articles, particularly to the teeth, to the gums, to the scalp, finger nails, to fine textiles and the like.

A brush having vertically orientated bristles exerts a pricking and picking action which will cause bleeding of the gums and destroy the tooth enamel. On the other hand, the massaging of the gums without their displacement from the teeth is one of the most important procedures to preserve the latter. Due to the pains created by the hitherto customary brushes the proper treatment of the gums is neglected.

This danger is obviously not eliminated but increased by inclining the bristle tufts in the longitudinal rows. By inclining the tufts in the individual transverse rows the action of the bristles due to the elasticity imparted to them by the particular type of inclination is mollified, picking and pricking effects are prevented and therefore the gums may be massaged for indefinite periods without pains or injuries being caused.

The inclination of the bristles in the transverse rows causes a better penetration of the bristles between the teeth and in the cavities thereof; therefore an intense cleaning action is obtained between the teeth. In an ordinary brush having for instance three longitudinal rows of bristle tufts, the first two rows are bent and do not penetrate between the teeth and any cleaning action would have to be carried out by the third row only.

It is, however, highly doubtful whether the third bristle row of an ordinary brush may successfully perform this function for the simple reason, that

5 this bristle row cannot penetrate in between the teeth and therefore will only exert a sort of polishing action; in the case of the present brush full penetration in between the teeth is assured by all the bristle rows.

With bristles which are inclined in the longitudinal rows this penetrative action is obviously prevented due to their inclination in the longitudinal direction; however, a brush which does not clean the spaces between the teeth is practically useless.

As already stated, an important improvement created by the instant brush is the increase of the operating area for an equal number of tufts compared with hitherto known brushes.

The operating end face of the bristles is greatly enlarged due to the inclined position; whereas the operating face of a vertical bristle tuft is circular, the working end area of a bristle or bristle tuft mounted in an inclined position in accordance with my invention is elliptic or oval and approximately double the size of that of a circular area of a vertically mounted tuft; accordingly a larger area can be cleaned with means saving in time and work.

Due to the fact that the tufts of the individual transverse rows are oppositely inclined, the operating face of the brush is practically doubled over a brush having the same number of vertical tufts. Moreover, during the spreading of the bristle tufts inclined in the manner of this invention the operating area will be further increased during use. Considering that the width of the brush back is equal to the width occupied by the bristle rows and an increase of the bristle rows will increase the width of the brush back which is greatly limited, this advantage greatly gains in importance.

This advantage is even more apparent in comparison with brushes having tufts oppositely inclined on the longitudinal rows, where only one row of tuft brushes, whereas the other one polishes or smooths-over. Due to the spreading of the tufts, the operating area of the present brush is additionally increased in an effective manner, whereas with a brush having longitudinally inclined bristles, the increase owing to the spreading during application is negligible. Brushes of this type might as well have only those rows where the bristles are inclined towards the front end.

The bristle tufts of the individual rows of the instant brush do not cross each other before they reach the operating face; the ends of the bristle tufts meet in the latter; accordingly inoperative voids created by the premature crossing are obviated and the operating area is rendered uniform.

The angular position of the bristles avoids the customary pointed configuration of the bristle ends; the bristles instead of terminating in a point have a broad end face at their ends.

Accordingly the tufts cannot abrade the surface to be cleaned or damage the same, as is often the case with pointed bristles.

Bristles having at their ends an oval or elliptic cross area do not create markings in the articles to be cleaned, which often happens with the customary pointed bristles; these pointed bristles particularly if applied with great pressure as long as they are still new and rigid damage and ruin the enamel of the teeth, channels and grooves in the enamel being the consequence of such procedures, which promote deterioration of the teeth.

The proper massaging of the gums by means of pointed bristles is painful, and as a consequence thereof this highly important treatment is mostly omitted; the bristles act as needles; their penetrating capacity, particularly during the first time of use, is so intensive that bleedings and injuries of

the gums result. These drawbacks are not even eliminated if the points or ends of the bristles are rounded, because vertically mounted bristles, whether pointed or rounded, exert a much stronger action and pressure than actually required.

If inclined bristles or bristle tufts are used in accordance with my invention the gums may be treated and massaged for indefinite periods of time without any pains or damages being encountered; still the cleaning and massaging effect is not lessened.

If the bristles or bristle tufts are alternately inclined and, therefore, arranged in a zig-zag manner the ends which immediately react on slight pressure and spread out assume a state of elasticity which is not inherent in straight or vertically mounted bristles.

If a customary brush having vertical bristles is pressed on a base the bristles have a tendency to penetrate into the latter; if the bristles are mounted in the back at an acute angle the bristle tufts react on minimum pressure and spread.

Nevertheless, the capacity of the bristles mounted in accordance with the principles of the invention to enter into cavities and between the teeth is not only not impaired but improved, and the cleaning capacity of the instant tooth-brushes is superior to ordinary tooth-brushes.

Vertically mounted bristles have the tendency, as previously explained, to pierce and bore into the faces treated thereby, if strong pressure is exerted; if less intensive pressures are applied the bristles bend without, however, changing the location of the pointed ends; as a consequence the danger of breakage due to continuous to and fro bending is greatly increased, because their elasticity is not sufficiently high to compensate the bending stresses.

The situation is entirely different with bristles and tufts which are mounted in accordance with the teachings of the invention. The bristles of a tuft react on even small pressures and spread out as the leaves of a rose. In this position they are more adapted to be reactive to its elasticity; in other words, the elasticity inherent in the bristles is given a better opportunity to exert a beneficial influence; therefore, the bristles do not break and retain their full working capacity for an indefinite time.

The operating area of a brush having inclined bristle tufts in accordance with this invention is increased with the time of use, because the bristle tufts which are preferably mounted at an angle of less than 35 degrees and preferably at 10 to 20 degrees spread out more and more. A tooth brush having at the start a working area equivalent to three adjacent tuft rows therefore has from the start a working capacity which equals that of an ordinary brush having five rows of bristles; this great initial working capacity is further increased by continued application to that of a customary brush, having six rows of bristles and more. Considering that it is very impractical or even impossible to manufacture broad tooth-brushes this advantage gains in importance.

The above recited phenomena are apparent independently upon the shape and construction of the brushes as tooth-brushes, nail-brushes or other cleaning brushes. Nail-brushes constructed in conformity with the principles of this invention have the great advantage that they do not pierce or injure the sensitive skin located underneath the nails; moreover they clean in one operation the nails also on their outside and function as a cuticle remover. If fingernails are brushed by the instant brush the observation is made that the bristles

4
7
which are inclined towards the nails separate the cuticula from the same and that a very thorough cleaning is accomplished of these portions; the nails create the appearance as if they had been manicured. This effect cannot be obtained with customary nail-brushes having vertical bristles.

Injuries to the scalp which are often caused by hard brushes can never occur by the application of the instant brushes, the bristles of which are inclined under specific precautionary conditions.

Having regard to the foregoing disclosure, the patent of which this specification forms part confers, subject to the conditions prescribed in The Patent Act, 1935, the exclusive right, privilege and liberty of making, constructing, using and vending to others to be used, the invention as defined in claims submitted by the patentee as follows:

Claims:

1. A brush comprising a longitudinal brush head, 20

8
adjacent parallel transverse rows of an equal number of bristle tufts secured in said head, all bristle tufts of one transverse row being inclined at an acute angle relative to the vertical longitudinal centre plane of said brush head and towards one side thereof and all the bristle tufts of the adjacent rows being inclined at the same acute angle towards the opposite side of the brush head.

2. In a brush according to claim 1 the inclination of the bristle tufts being controlled in such a manner that the ends of all tufts essentially meet in the working face of the brush.

3. In a brush according to claim 1 the magnitude of inclination of the tufts being approximately 12 degrees.